iPAX
European Implementation of the ATN

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Agenda

- What is it?
- Why has it happened?
- Its Mission and Objectives
- Current Status
- What's to be done
- What has been learnt
- Tools for Migration
- Conclusions

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What is iPAX?

- Task Force – iPAX-TF (Set-up in July 2001)
- Evolve Current X.25 to TCP/IP
- Network Infrastructure and Services
- 25 experts from 15 States
- Ground-data oriented, but system-wide support is mandated e.g. voice, mobility
- Use standard products within the ATM sector
- Secure Network Service
- Target – End 2003

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Why?

- Decline of X.25
- IP is omnipresent and mature (**COMMODITY)**
- IPv4 world-wide & widely used in ATM sector
  - (Regional & National)
- IPv6 – Pushed by EC
  - (Press Release 29/01/02)
- Supports data, voice, mobility and security
- Lack of Alternative

iPAX-TF Mission?

" To develop or modify guidelines, specifications and possibly aeronautical standards related to the exchange of data between ATS or CNS systems based on the TCP/IP protocol suite with the aim to propose an alternative for the eventual replacement of the X.25 protocol in ATS/CNS."

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iPAX-TF Objectives (Terms of Reference)

- Develop an Addressing Scheme
- Identify Security Mechanisms
- Development of Specifications for Transition to IP

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iPAX Plan

1) Modify the X.25 communication layers with the sole open industry standard : the internet protocol (IP) with built-in security
2) Modify the applications and systems to interface to a secure IP network
3) Maintain the application interface to the user to protect both application and ATM system investments

   It will be the European regional implementation of the ICAO ATN internet SARPs

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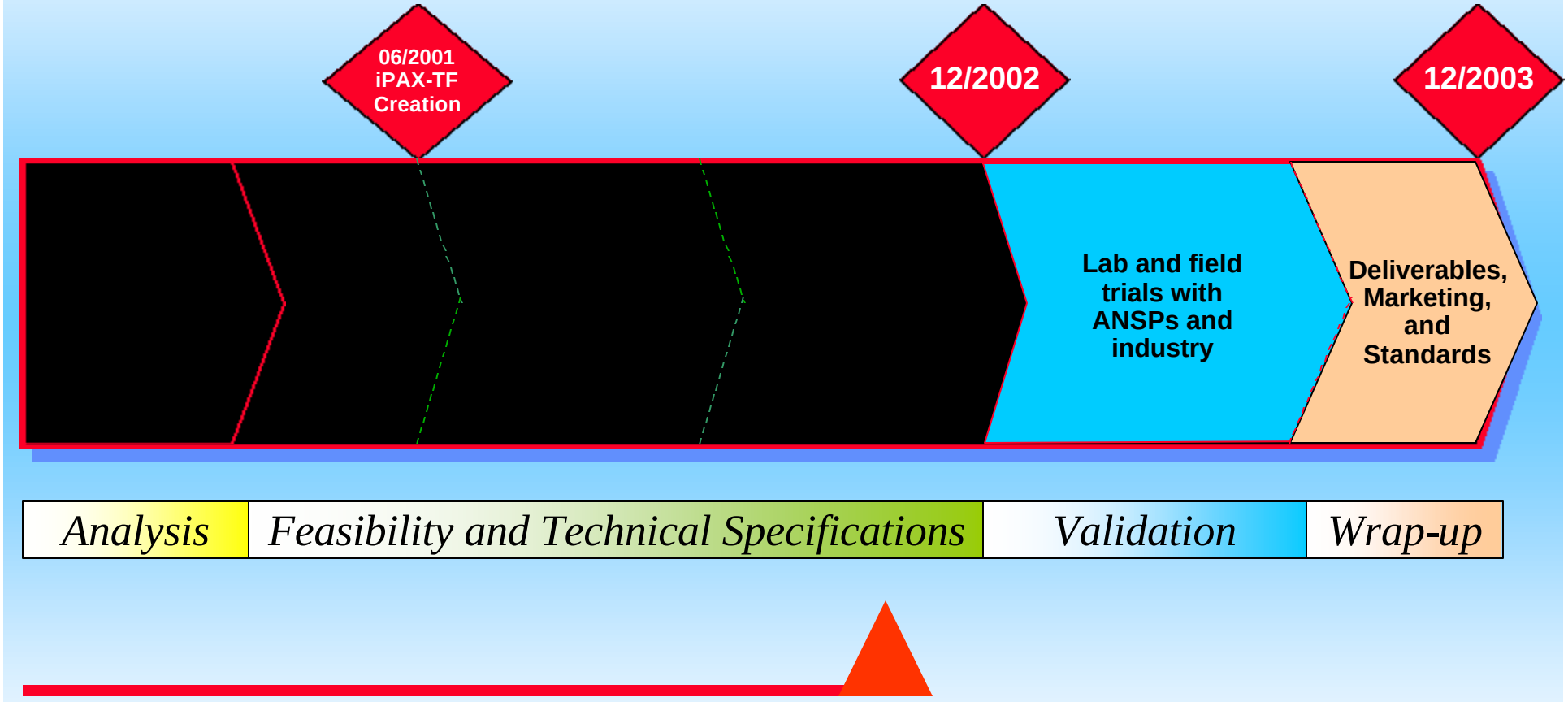
The Critical Path



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Current Status

- Topology IPv6 Backbone
- OLDI over TCP/IP
  - 1st Draft Specified & Released (03/2002)
  - IPv4 & IPv6 Independent
  - Flexible Dual Approach to Security
    - Layer 3 & 4
- Defining IP Services
  - IPv6 or IPv4
  - IPv6 Timely with Market for 2005

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Current Status (Cont'd)

- Security, PKI, IKE
  - NATS destroys security
  - Network Topology
  - CA & RA
  - Intrusion Detection?
- Network Topology
  - IPv6 Backbone – who?
  - IPv6 Addresses (RIPE)
- Redundancy & Backup

Current Status (Cont'd)

- Ability to connect to Internet at multiple points is required
- Provider Independent addressing is the key component migration before any change is made

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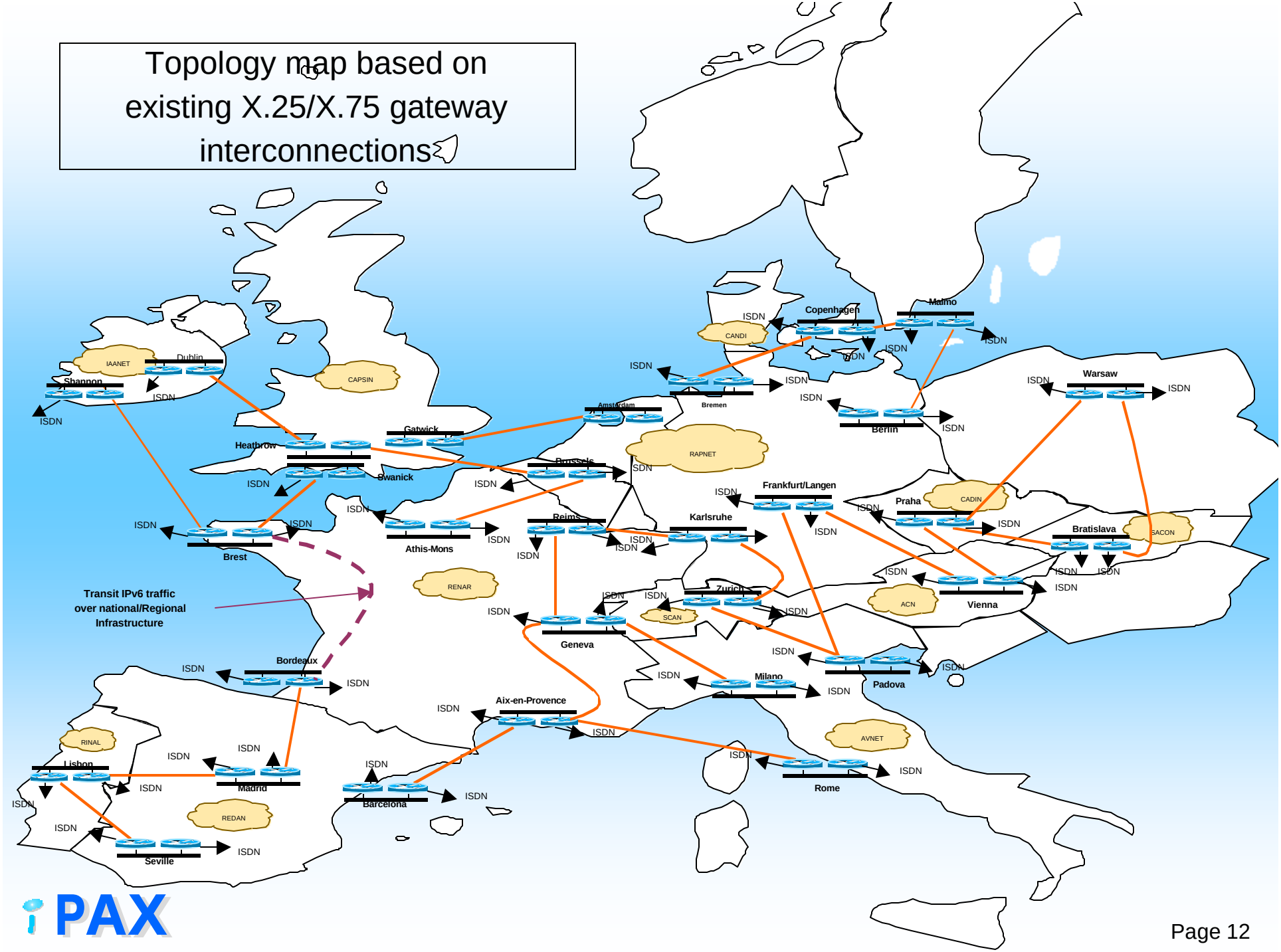
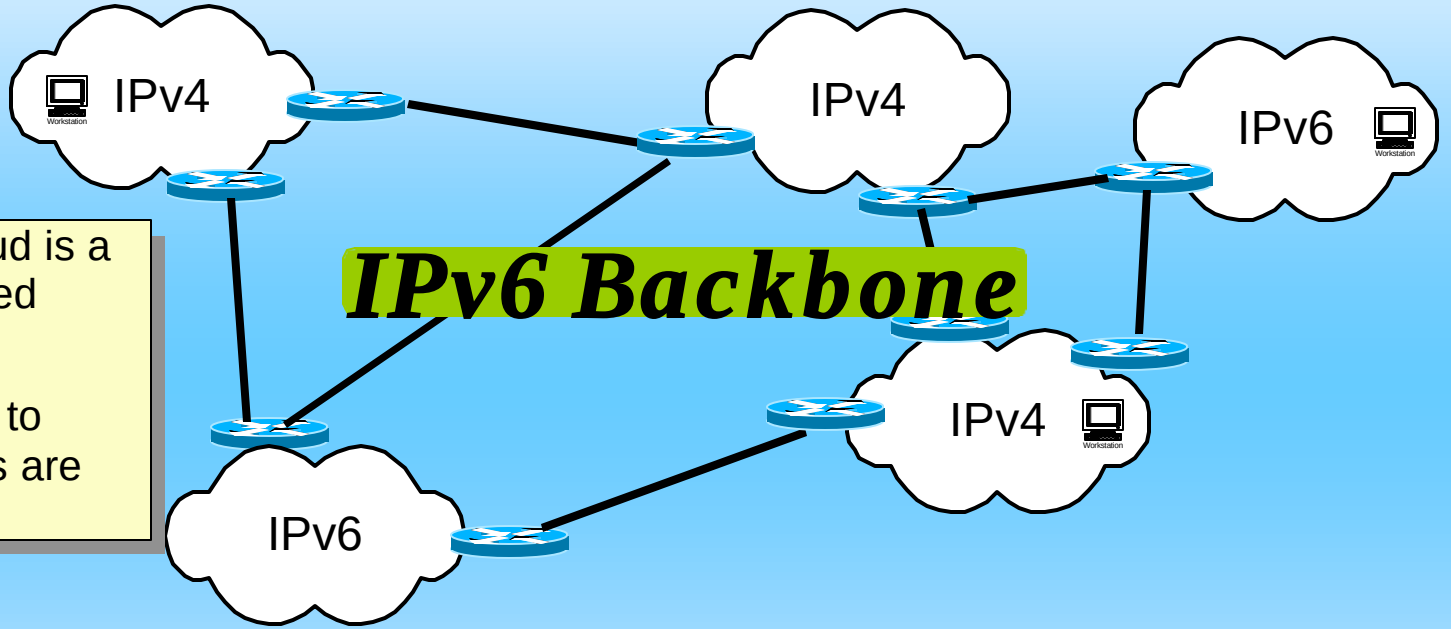
Topology map based on existing X.25/X.75 gateway interconnections



Current Status (Cont'd)



- Each IPv4/6 cloud is a locally administered country network
- All border router to border router links are IPv6 based

Topology of iPAX network

Lessons Learnt

- Missing Reference to COTS
- Missing Validation and Certification
- Coupling: Addressing & Architecture
- Consideration of Mobile IP
- CIDIN not addressed
- AMHS support – Priority

Lessons Learnt (Cont'd)

- Impact of VoIP
- Directory Services Extensions
- Missing IP Routing Services
- Multicast missing
- Eurocontrol/FAA co-ordination

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Essentials Tools for Migration

- RMCDE/SCR/SIR for surveillance data
- ECG for flight data (AMHS, AFTN/CIDIN and OLDI)
- Standard multi-protocol IP routers

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Summary

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- What has been learnt
- Essential Tools for Migration

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Conclusions

- IPv6 important
- Lot of work to be done
- Time Scales Tight
- Good Support from States
- Air/Ground Cannot be Ignored
- ICAO support for IPv4/v6
- Similar Task Force in US?

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